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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/849,519	05/20/2004	Hiroo Takizawa	Q81712	7137

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2100 PENNSYLVANIA AVE. NW
WASHINGTON, DC 20037-3213

EXAMINER	
ANGEBRANNDT, MARTIN J	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/849,519	TAKIZAWA, HIROO	
	Examiner	Art Unit	
	Martin J. Angebranndt	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/20/04 & 11/30/06*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/20/04 & 11/30/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims cannot depend upon more than one claim except in the alternative.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 5,13,14 and 17-24 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Smothers et al. '977.

See examples, where Vinac B-100 is a binder, sartomer and photomer are monomers, o-Cl-HABI is a photoinitiator and the sensitizers is S-3 (table II). See also table III. The addition of

S-1, S-2 or S-3 sensitizers to the composition disclosed in column 19 which includes a binder, tracrylate and trimethacrylate monomers, o-Cl-HABI as the initiator and leuco crystal violet (columns 19 and 20). After imaging exposure these are flood exposed uing UV/Vis from a mercury arc lamp, heated and the diffraction efficiency measured (17/67-18/14).

Note that claim 20 does not require a two photon exposure, merely use of the recited composition with an exposure process. The two photon exposure limitation does not appear until claims 25 and 26, so it is clear that single photon exposures are embraced by the claims rejected under this heading. As the diffraction is induced by the refractive index change and is relatable to the refractive index change, the examiner holds that this measurement inherently is a measurement of the refractive index change. This is congruent with the measurement recited in claim 15 of the instant application.

6. Claim 19-26 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Akiba et al. JP 2003-073410

Akiba et al. JP 2003-073410 teaches that hyperfine three dimensional polymerized structure using two photon excitation [0001]. The reaction only occurs within the focal volume of the laser. [0002]. The use of cyanine dyes is taught (see dyes 13, 14, 27,2841,42,55,56,69,7083,8497,98,111,112,125,126 and 139-140 in tables. Note that dye 13 ids almost identical to sensitizer S-1 of Smothers et al. '977 and dye 41 is almost identical to sensitizer S-5 of Smothers et al. '977. The two photon dye can be used with either free radically or cationically polymerizable materials which may include binders and other additives [0037-0040]. The use of various lasers, including those operating at 620-680,780, ~1000 and 1053 nm is disclosed. [0041-0042]. See examples 1 and 2.

It would have been obvious to one skilled in the art to modify the cited examples including the two photon absorber by adding a binder based upon the direction at [0039-0040] with a reasonable expectation of forming a two dimensional image.

7. Claims 1-2,5,9,10,13,14 and 17-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smothers et al. '977, in view of Diamond et al., "Two-photon holography in 3-D photopolymer host-guest matrix", Optics Express, Vol. 6(3) pp. 64-68 (01/2000) and Akiba et al. JP 2003-073410

Diamond et al., "Two-photon holography in 3-D photopolymer host-guest matrix", Optics Express, Vol. 6(3) pp. 64-68 (01/2000) uses the exposure set up shown in figure 1, where the mirror on the adjustable stage is the second arm with the variable delay and both the beam returning from the retroreflector and the mirror on the adjustable stage are focused through the lens with the 16 NA on the composition which includes a pentafunctional acrylate (DPEPA), a photoinitiator (BDMK). (page 65). Due to the non-linear process of the two photon recording, the fringe spacing can be less than in one photon gratings (page 67) and the ability too form isolated recordings (low background recording).

To address the use of a second (curing) step the examiner formulates the following rejection. It would have been obvious to one skilled in the art to modify the process of the cited examples of Smothers et al. '977 by using this composition with a two photon exposure process as disclosed by Diamond et al., "Two-photon holography in 3-D photopolymer host-guest matrix", Optics Express, Vol. 6(3) pp. 64-68 (01/2000) to form smaller features (sub-diffraction limit) and/or isolated three dimensional structures with a reasonable expectation of successfully

realizing two photon absorption based upon the teachings of Akiba et al. JP 2003-073410 using a laser operating at ~1053 nm as taught by Akiba et al. JP 2003-073410 .

The claims do not preclude polymerization of the latent image prior to the second step. The applicant could insert - - only - - after "to form" based upon the language at [0027] of the prepub of the instant application.

8. Claims 19-21 and 25-26 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Lipson et al. '606.

Lipson et al. '606 teach a photopolymer compoisition comprising a naphthacene sensitizer, an iodonium salt photoinitiator, a epoxy monomer composition (PC 1000/1004) and a binder Dow Coring 705. (14/55-15/13). The format hologram is recorded using 532 nm laser radiation and later two photon alteration is performed using 659 nm laser radiation (15/23-16/10).

The second irradiation is a two photon process.

9. Claims 1-2,5,17-21 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lipson et al. '606, in view of Megens et al. '501 and Belfield et al. "Near-IR two photon absorbing dyes and photoinitiated cationic polymerization.", Polymer Preprints, Vol. 41(1) pp. 578-579 (03/2000).

Megens et al. '501 teaches incorporation of a neutralizer to cationically curable compositions, based upon epoxies, a sensitizer and an iodonum salt so that exposure at room temperature does not significantly catalyze polymerization [0038-0044). This is followed by a heating step. The prevention of the refractive index changes preserves the fringes and prevents washout of the finer structure [0006-0008].

Belfield et al. "Near-IR two photon absorbing dyes and photoinitiated cationic polymerization.", Polymer Preprints, Vol. 41(1) pp. 578-579 (03/2000) teaches a fluorene sensitizer together with an onium salt and epoxides to facilitate two photon recording which is useful for spatially resolved imaging as there is no absorption/reaction outside the focal volume.

To address the embodiments bounded by the claims, but not anticipated above, the examiner holds that: It would have been obvious to one skilled in the art to modify the process of lipson et al '606 by adding a neutralizer when forming the fringes and thereafter heating the composition to initiate polymerization to preserve the fringe structure and to use a two photon recording process to allow the formation of localized gratings as taught by Belfield et al. "Near-IR two photon absorbing dyes and photoinitiated cationic polymerization.", Polymer Preprints, Vol. 41(1) pp. 578-579 (03/2000).

10. Claims 1-2,5,9,10,13,14 and 17-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiba et al. JP 2003-073410, in view of Megens et al. '501 and Belfield et al. "Near-IR two photon absorbing dyes and photoinitiated cationic polymerization.", Polymer Preprints, Vol. 41(1) pp. 578-579 (03/2000) and Lipson et al. '606.

To address the embodiments bounded by the claims, but not anticipated or rendered obvious above, in particular where the polymerization is delayed after exposure, the examiner formulates the following rejection. It would have been obvious to one skilled in the art to modify the media of Akiba et al. JP 2003-073410 including a binder rendered obvious above, using a two photon interferometric exposure such as that taught by Belfield et al. "Near-IR two photon absorbing dyes and photoinitiated cationic polymerization.", Polymer Preprints, Vol. 41(1) pp. 578-579 (03/2000) and adding a neutralizer to prevent premature polymerization and a heating

step to facilitate the imagewise polymerization as taught by Megens et al. '501 to resolve the fine fringe structure with a reasonable expectation of the binder not affecting the suitability of the composition for holography based upon the teachings of Lipson et al. '606.

11. Claims 19-21 and 25-26 are rejected under 35 U.S.C. 102(b) as being fully anticipated by DeVoe et al. WO 01/96917.

See the composition of the active layer on page 37, where CGI-7460 is the photoinitiator, Cellulose acetate butyrate is the binder, the acrylates are the monomers and the Bis-[4-diphenylamino)styryl]-1,4-dimethoxy)benzene and this is exposed using a two photon process. (pages 37-38). The use of uniform curing to form an encapsulated waveguide, rather than development, is disclosed (pages 12-14 & 32) . This blanket cure can utilize any mechanism includes single or multiphoton absorption (page 8 and 13-14)

12. Claims 5 and 18-21 are rejected under 35 U.S.C. 102(e) as being fully anticipated by Lungu '025.

Composition in example 1 includes a binder, a diacrylate monomer, photoinitiator, a leuco dye (crystal violet lactone) and an iodonium salt. This is exposed to UV for 45 seconds to form a floor and a second longer, imagewise exposure to form colored images in those areas, which were also polymerized by this exposure.

As there is a one photon absorption there will be a two photon absorption, but the cross section varies between compounds.

13. Claims 5 and 18-21 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Wada JP 61-183644.

Composition in example 1 includes a binder, an acrylate monomer, UV photoinitiator, a leuco dye and optionally a sensitizing dye.

As there is a one photon absorption there will be a two photon absorption, but the cross section varies between compounds.

14. Claims 5 and 18-21 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Arakai et al. JP 59-178488.

Composition in example 1 includes a binder, a diacrylate monomer, UV photoinitiator, a leuco dye and a cyanoaromatic sensitizing dye.

As there is a one photon absorption there will be a two photon absorption, but the cross section varies between compounds.

15. Claims 5 and 18-21 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Fujikawa et al. '373.

Composition in example 4 includes a binder, a dimethacrylate monomer, two UV photoinitiators, a leuco dye and a dark (thermal) coloration preventing agent .

As there is a one photon absorption there will be a two photon absorption, but the cross section varies between compounds.

16. Claims 5 and 18-21 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Jolly et al. WO 80/01846.

Composition in example 1 includes a binder, a dimethacrylate monomer, a photoinitiators, a sensitizing dye and a leuco dye (crystal violet lactone). (see page 17)

As there is a one photon absorption there will be a two photon absorption, but the cross section varies between compounds.

17. Claims 19-21 and 25-26 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Fleming et al. WO 01/96961

Composition in example 3 includes a binder, two monomers, a diphenyl iodonium salt photoinitiator and a two photon absorbing dye which is written upon using a Ti:sapphire laser.(page 60). Useful monomers are disclosed on pages 16-21. The addition of leuco dyes which become colored when oxidized is disclosed. (pages 22-24). See also example 4 (page 62), and example 5 (page 64).Useful multiphoton absorbers are disclosed (pages 25-37).

18. Claims 5,17-21 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fleming et al. WO 01/96961.

It would have been obvious to one skilled in the art to modify the compositions of the cited examples by adding a leuco dye based upon the direction at pages 22-24 to allow visualization of the exposed image.

19. Claims 1-8,15-21 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fleming et al. WO 01/96961, in view of DeVoe et al. WO 01/96917, Arakai et al. JP 59-178488 and JP 74015490.

JP 74015490 teaches a free radically generated coloration which spectrally sensitizes a photosensitive composition. The photoactive agent can be present in amounts of 10-750 parts, the color changing agent can be present in amounts of 10-800 parts, the leuco dye 5-800 parts, the binder 5-100 parts, a color tone improver 0-20 parts, a stabilizer 0-20 parts, a spreading agent 0-30 parts and a solvent 500-1500 parts. (column 8).

To address the embodiments bounded by the claims, but not anticipated or rendered obvious by over Fleming et al. WO 01/96961 alone, the examiner holds that it would have been

obvious to modify the process utilizing the leuco dye containing compositions rendered obvious above which has the advantage of forming a colored image as evidenced by Arakai et al. JP 59-178488 and JP 74015490 and by using a blanket cure to form a refractive index image or waveguide article as taught by DeVoe et al. WO 01/96917 and that the polymerization rate will be enhanced due to the presence of the colored leuco dye as evidenced by JP 74015490 which describes spectral sensitization due to the presence of the colored leuco dye.

20. Claims 1-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fleming et al. WO 01/96961, in view of DeVoe et al. WO 01/96917, Arakai et al. JP 59-178488 and JP 74015490, further in view of Akiba et al. JP 2003-073410.

To address the embodiments bounded by the claims, but not rendered obvious by the combination immediately above, the examiner holds that it would have been obvious to one skilled in the art to modify the combination of Fleming et al. WO 01/96961 with DeVoe et al. WO 01/96917, Arakai et al. JP 59-178488 and JP 74015490 by using other two photon absorbers, such as those disclosed by Akiba et al. JP 2003-073410 with a reasonable expectation of forming a useful photocurable and/or photocured articles.

21. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference

claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

22. Claims 1-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of copending Application No. 11/510656 (US 2007/0048666). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims both embrace the heating to develop latent image into a refractive index image.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

23. Claims 1-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-40 of copending Application No. 10/874344 (US 2005/0003133). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims both embrace the development of the latent image into a refractive index image and in particular the coloration of the leuco dye using the two photon exposure.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

24. Claims 1-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. 10/925086 (US 2005/0058910). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims both embrace a composition including a two photon absorber, a photoinitator, a polymerizable compound and binder and the use thereof with a second treatment to develop the latent image.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

25. Claims 19-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 5-18 of copending Application No. 10/804144 (US 2004/0204513). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims both embrace a composition including a two photon absorber, a photoinitator, a polymerizable compound and binder.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

26. Claims 1-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-29 of copending Application No. 11/360439 (US 2006/0194122). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims both embrace a composition including a two photon absorber, a photoinitator, a polymerizable compound and binder.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

27. Claims 1-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-21 of copending Application No. 11/509563 (US 2007/0047038). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims both embrace a composition including a two photon absorber, a photoinitator, a polymerizable compound and binder.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

28. Claims 1-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-23 of copending Application No. 11/359566 (US 2006/0188790). Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims both embrace a composition including a two photon absorber, a photoinitator, a polymerizable compound and binder.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bakeman et al. '160 and Cowan '216 discuss sub-threshold exposures.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Martin J Angebranndt
Primary Examiner
Art Unit 1756

07/02/07